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IS : 1543 - 1964

Indian Standard
SPECIFICATION FOR SINGLE CYLINDER FUEL INJECTION PUMPS
(Revised)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

December 1964

AMENDMENT NO. 1 SEPTEMBER 1983

TO

IS:1543-1964 SPECIFICATION FOR SINGLE CYLINDER FUEL INJECTION PUMPS

(Revised)

Alteration

(*Page 8, clause 6.2*) - Substitute the following for the existing clause:

'6.2 **Vent Screws and Inspection Windows** - Vent screws and inspection windows are optional and may be provided provided subject to agreement between the purchaser an and the manufacturer.'

Addenda

(*Page 8, Fig. 4*) - Add the following new note under the existing Fig. 4:

> 'Note - For single cylinder pumps used on single cylinder engines, marking on the rack is optional. Whenever, a single cylinder pump is used for multi-cylinder engines, the marking on the rack is compulsory.'

(*Page 8, clause 6.3*) - Add the following at the end of the existing clause:

> 'Where special application requires, other types of control rods may be provided.'

(*Page 9, Table 1*):

a) *Col 2, sixth entry* - Add the following at the end of the existing entry:

'(Optional)'

b) *Col 3, first entry* - Add '14'.

c) *Col 4, last entry* - Add '7.5.'

(EDC 14)

Reprography Unit, ISI, New Delhi, India

Indian Standard
SPECIFICATION FOR SINGLE CYLINDER FUEL INJECTION PUMPS
(Revised)

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Indian Standard
SPECIFICATION FOR SINGLE CYLINDER FUEL INJECTION PUMPS
(Revised)

0. FOREWORD

0.1 This revised Indian Standard was adopted by the Indian Standards Institution on 14 May 1964, after the draft finalized by the Internal Combustion Engines Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 This standard was first published in 1960. During the few years for which this standard has been in use, certain modifications and improvements have been suggested which have necessitated the revision of this standard. Apart from the editorial improvements, the following are the main modifications:

a) The word ' element ' has been substituted by the word ' component ' as it has been made out that the word ' element ' when referred to fuel injection pumps has a specific meaning, that is, the combined unit of the barrel and the plunger.

b) The nomenclature of a few important parts has been added. In Table 1 against alphabetical reference ' *d* ', the word ' BTC ' has been replaced by ' bottom dead centre '.

c) A method of designating the pump for inquiry and order has been included.

0.3 In this standard, only those dimensions which are essential for ensuring the interchangeability between fuel pumps of different makes have been specified. The methods for testing the pumps for proper functioning have also been included. In order to allow scope for development and improvement, requirements of materials for the different components and their design details have been left to the manufacturer.

0.4 This standard is one of the series of Indian Standards being prepared for fuel injection equipment for internal combustion engines. The other standards under preparation in this series will cover nozzles, nozzle holders and connecting parts for fuel injection equipment.

0.5 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.7 This standard is intended chiefly to cover the technical provisions relating to single cylinder fuel injection pumps, and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This standard covers the requirements for three types of single cylinder, constant stroke, fuel injection plunger pumps without integral camshafts.

2. TYPES OF FUEL INJECTION PUMPS

2.1 The pumps covered in this standard have been classified into three types, depending upon the length of a stroke, as follows:

Type	*Nominal Length of Stroke*
	mm
A	8
B	10
C	15

3. NOMENCLATURE

3.1 The nomenclature used for the different components of a single cylinder fuel injection pump has been given in Fig. 1 to 3.

4. DIMENSIONS

4.1 The dimensions of fuel injection pumps of Types A, B and C shall be as given in Table 1 and Fig. 4.

4.2 The dimensions for threads for inlet and outlet shall conform to those specified in *IS : 1362-1962 Dimensions for Screw Threads for General Purposes (Diameter Range 1·6 to 39 mm) (*Revised*).

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*Since withdrawn.

5. DESIGNATION

5.1 The designation of a fuel injection pump shall indicate:

a) commonly used name,

b) type,

c) plunger diameter,

d) the number of this standard, and

e) any other information such as inspection windows for Type B and Type C only.

Example:

A single cylinder fuel injection pump of Type A, having plunger diameter 6 mm shall be designated as:

Single Cylinder Fuel Injection Pump A6 IS : 1543

6. GENERAL REQUIREMENTS

6.1 The fuel injection pumps shall be of robust construction incorporating the highest quality material and workmanship in accordance with the best trade practice.

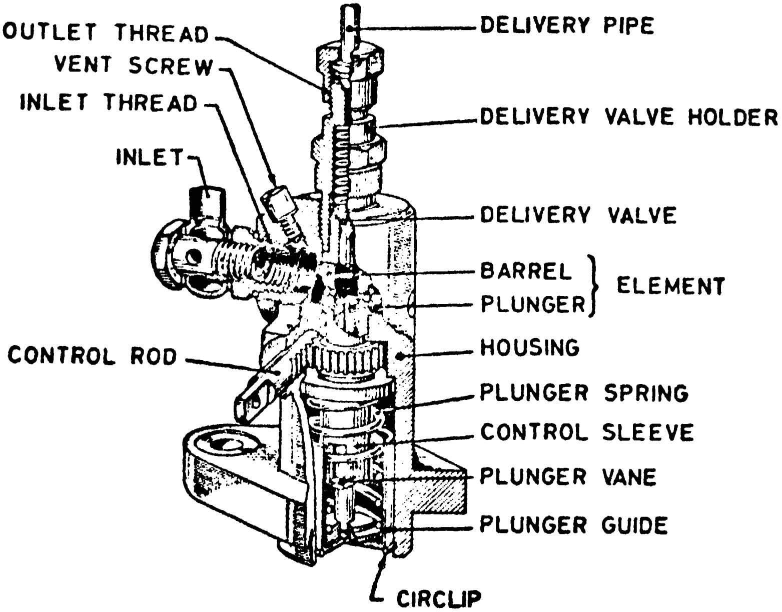

FIG. 1 A TYPICAL SECTIONAL VIEW OF PUMP

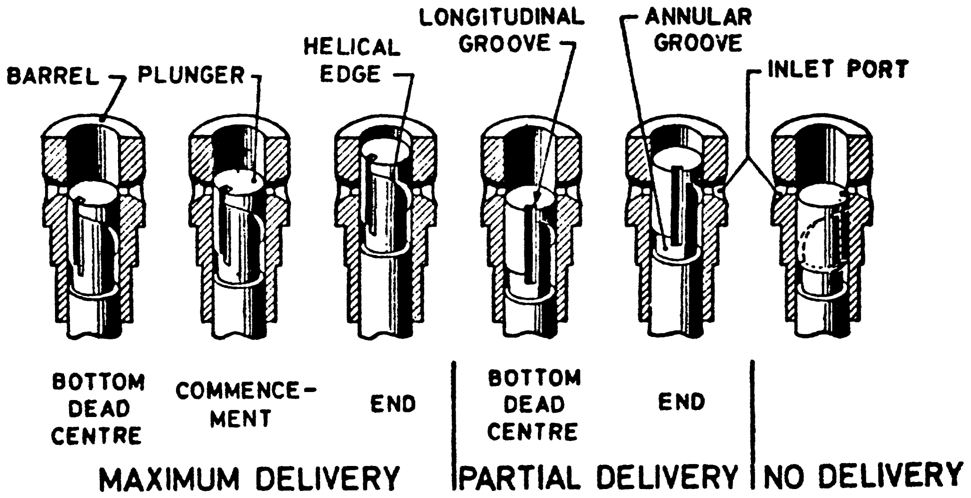

Fig. 2 A Typical Sectional View of Pump Element

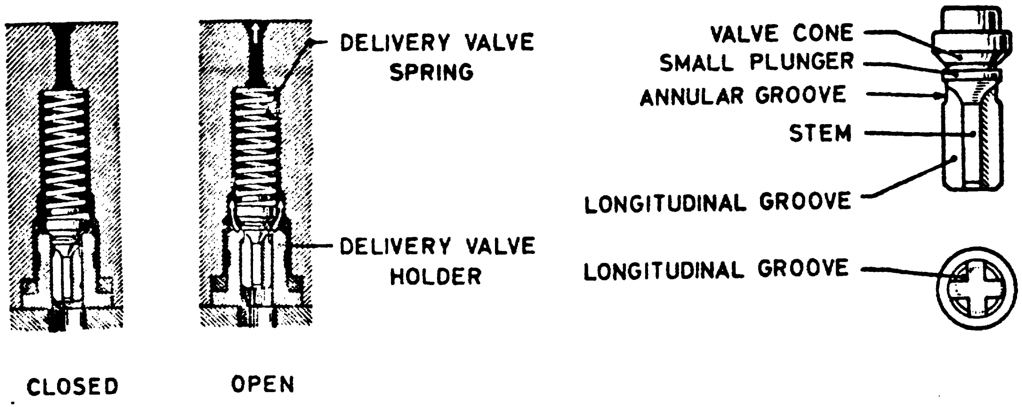

FIG. 3 DELIVERY VALVE (A TYPICAL SECTION)

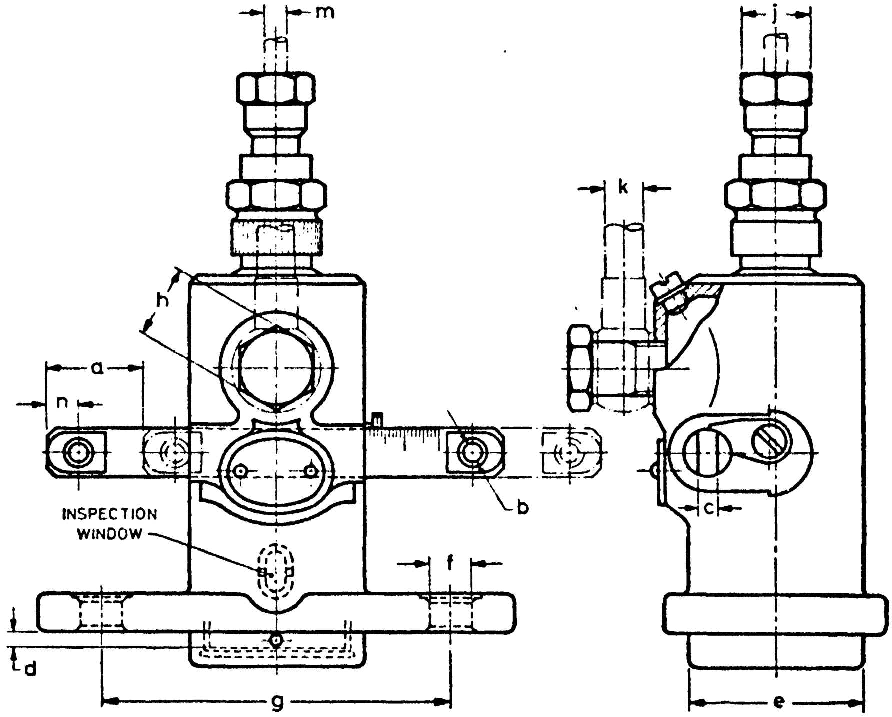

FIG. 4 DIMENSIONS OF FUEL INJECTION PUMP

6.2 Vent Screws and Inspection Windows — Vent screws shall be provided in all the three types of pumps. In addition, inspection windows may be provided in Type B and Type C pumps, if specially required by the purchaser.

6.3 Control Rod — The control rod shall be graduated in millimetres to indicate its travel. It shall also be marked to indicate conspicuously 'no-injection' position as 'O' and the maximum travel position '*a*', as given in Table 1 and Fig. 4.

6.3.1 The control rod shall move freely and the force required to move it from 'no-injection' position to the 'maximum travel' position shall not exceed the following limits when tested at the speeds given:

Type of Pump	*Plunger Strokes per Minute*	*Force Required to Move Control Rod in Gram Force*
A	0	80
	1 000	40
B	0	400
	600	100
C	0	2 000
	400	600

TABLE 1 DIMENSIONS OF FUEL INJECTION PUMPS

(*Clauses* 4.1 *and* 6.3 and *Fig.* 4)

ALPHABETICAL REFERENCE IN FIG. 4	PARTICULARS	DIMENSIONS FOR		
		Type A	Type B	Type C
(1)	(2)	(3)	(4)	(5)
		mm	mm	mm
—	Pitch of plunger helix	15	20	40
—	Plunger diameter	5, 6, 7, 8 & 9	5, 6, 7, 8, 9, 10 & 11	10, 11, 12, 13, 14, 15, 16, 17 & 18
—	Inlet threads	M14 × 1·5	M14 × 1·5	M 18 × 1·5
—	Outlet threads	M12 × 1·5	M14 × 1·5	M 18 × 1·5
a	Control rod travel	21	25	36
b	Diameter of connecting hole in control rod	$5{\cdot}00\,^{+0{\cdot}04}_{-0}$	$5{\cdot}00\,^{+0{\cdot}04}_{-0}$	$6{\cdot}00\,^{+0{\cdot}04}_{-0}$
c	Thickness of control rod connecting end	$5{\cdot}00\,^{+0}_{-0{\cdot}1}$	$5{\cdot}00\,^{+0}_{-0{\cdot}1}$	$6{\cdot}00\,^{+0}_{-0{\cdot}1}$
d	Distance between flange seating and bottom dead centre of plunger guide after mounting	$3{\cdot}20 \pm 0{\cdot}4$	$9{\cdot}70 \pm 0{\cdot}5$	$5{\cdot}50 \pm 0{\cdot}5$
e	Mounting sleeve diameter	$35{\cdot}00\,^{+0}_{-0{\cdot}10}$	$45{\cdot}00\,^{+0}_{-0{\cdot}10}$	$65{\cdot}00\,^{+0}_{-0{\cdot}15}$
f	Diameter of mounting holes	8·5	*11·0	18·0
g	Distance between centres of mounting holes	$60{\cdot}00 \pm 0{\cdot}1$	$90{\cdot}00 \pm 0{\cdot}1$	$112{\cdot}00 \pm 0{\cdot}1$
h	Width across flats of the hexagon of the inlet pipe connection	$19{\cdot}00\,^{+0}_{-0{\cdot}15}$	$19{\cdot}00\,^{+0}_{-0{\cdot}15}$	$24{\cdot}00\,^{+0}_{-0{\cdot}15}$
j	Width across flats of the hexagon of the outlet pipe connection	$17{\cdot}00\,^{+0}_{-0{\cdot}15}$	$19{\cdot}00\,^{+0}_{-0{\cdot}15}$	$22{\cdot}00\,^{+0}_{-0{\cdot}15}$
k	Inlet pipe outside diameter (nominal)	10	10	15
m	Outlet pipe outside diameter (nominal)	6	6	8
n	Distance from the centre line of hole in the control rod to the end of control rod	6	8	8

*It shall be permissible to use a 12·0-mm hole instead, during the period of transition.

6.4 The different components shall be assembled and held in position in the fuel pump housing by a circlip mounted in a conveniently removable position to facilitate dismantling.

7. TESTS

7.1 Sampling — The sampling and criteria for conformity shall be as agreed upon between the purchaser and the supplier.

7.2 Test Oil — Any light and chemically inert oil having a viscosity corresponding to Grade A of *IS : 1460-1959 Specification for Diesel Fuels may be used.

7.3 Test for Tightness Against Fuel Inlet Pressure — The fuel injection pump shall be submerged in the test oil (*see* **7.2**) maintained at 50°C and an air pressure of 1 kgf/cm^2 shall be applied at the fuel oil inlet. There shall be no leakage of air from any part of the pump.

Note — In actual service, the ambient temperature may, at times, exceed 50°C and hence the pumps should be so designed as to be reasonably free from leakage at temperatures higher than even 50°C.

7.4 Test for Tightness Against Injection Pressure — The fuel injection pump, when operated with test oil (*see* **7.2**) at 50°C against the nozzle release pressure as given below, shall not show any leakage between delivery valve holder and pump body:

Type of Pump	*Nozzle Release Pressure* kgf/cm^2
A	175
B	175
C	300

7.5 Discharge Characteristics — Unless otherwise agreed upon between the manufacturer and the purchaser, the test shall be carried out under the following conditions:

Sl No.	Characteristic	Type of Pump		
		A	B	C
1.	Strokes per minute	1 000	600	400
2.	Control rod position in mm (distance from ' O ' position)	18	18	33
3.	Inlet pressure in kgf/cm^2	0·5	0·5	0·5
4.	Nozzle release pressure in kgf/cm^2	175	175	300
5.	Delivery pipe length in mm	600	600	500
6.	Oil temperature °C	50	50	50

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*Since revised.

7.5.1 *Pump Discharge* — The permissible variation from the stated value of fuel discharge shall be subject to agreement between the manufacturer and the purchaser, but this shall not vary from the stated value by more than the following:

Type of Pump	*Permissible Variation from the Stated Value of Discharge, Percent*
A	±10
B	± 6
C	± 4

8. MARKING

8.1 Each pump shall be fitted with a name-plate giving:

a) the name of manufacturer or trade-mark,

b) manufacturer's serial number or other marking which will enable identification of the pump, and

c) type and plunger diameter.

8.1.1 The pumps may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. PACKING

9.1 Each pump shall be filled and operated a few times with good preservative oil, and completely drained leaving a thin film of preservative. The open orifices shall be suitably sealed against the ingress of foreign matter. Outside surfaces shall be painted. The pumps shall be wrapped in accordance with the best trade practice to ensure that there is no deterioration under reasonably good storage conditions.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg. 1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 26 60 21, 27 01 31 **Telegrams : Manaksanstha**

Regional Offices:		Telephone
Western : Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
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